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## SOME RELATIONSHIPS OF THE FLORA OF THE CUMBERLAND PLATEAU AND CUMBERLAND MOUNTAINS IN KENTUCKY

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BOTANIZING in eastern Kentucky is particularly interesting because of the element of surprise which is introduced from time to time by the finding of totally unexpected plants. That part of the state to the east and south of the Blue Grass is in the Appalachian Plateaus Province,<sup>1</sup> made up of the Allegheny Plateau northward and the Cumberland Plateau southward (drainage basins of Kentucky and Cumberland rivers) with maximum elevations from about 1200 feet on the west to about 2000 feet on the east; and the much more rugged Cumberland Mountains in the extreme southeastern part of the state (FIG. 1).

It will be noted that this Cumberland Mountain section is separated from the Blue Ridge Province—commonly called the Southern Appalachians—by the broad strip of longitudinal valleys and ridges comprising the Ridge and Valley Province. Furthermore, it does not attain the altitude of that Province, the maximum elevation being slightly over 4000 feet.

The flora to be expected in eastern Kentucky is that of the Alleghenies generally. Because of geographical location, Kentucky is a meeting place of northern and southern Allegheny species. We expect, hence, to find white pine and magnolias, for instance, but we do not expect the extreme northern forms which extend south in the

<sup>1</sup> Physiographic provinces after Fenneman (1928).

higher mountains (at least we do not expect them at low elevations); neither do we expect to find in the plateaus and mountains any considerable number of plants from the Coastal Plain; nor, because of the separation from the Blue Ridge Province, typical Southern Appalachian species in any quantity. Yet all of these groups of species do occur.

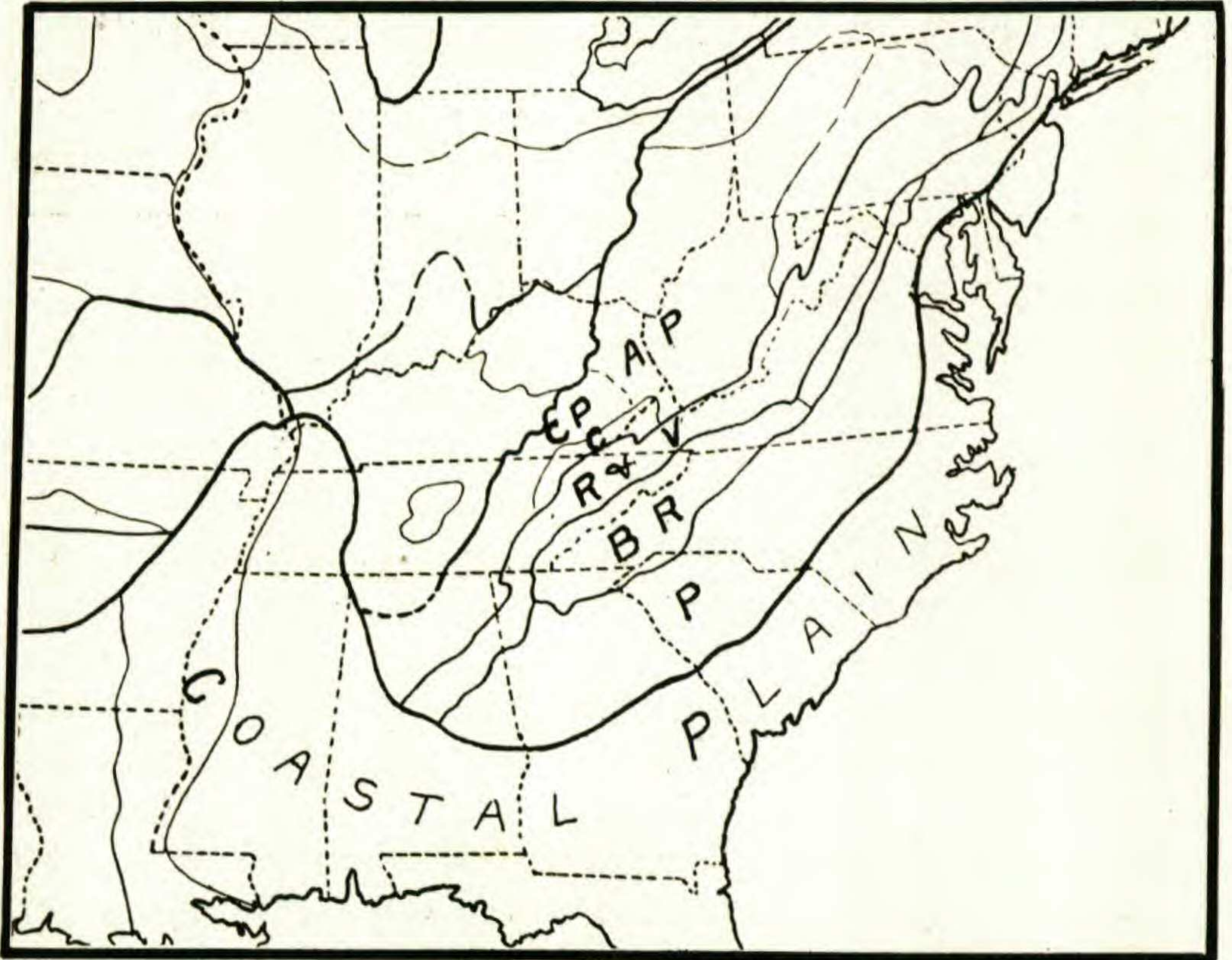
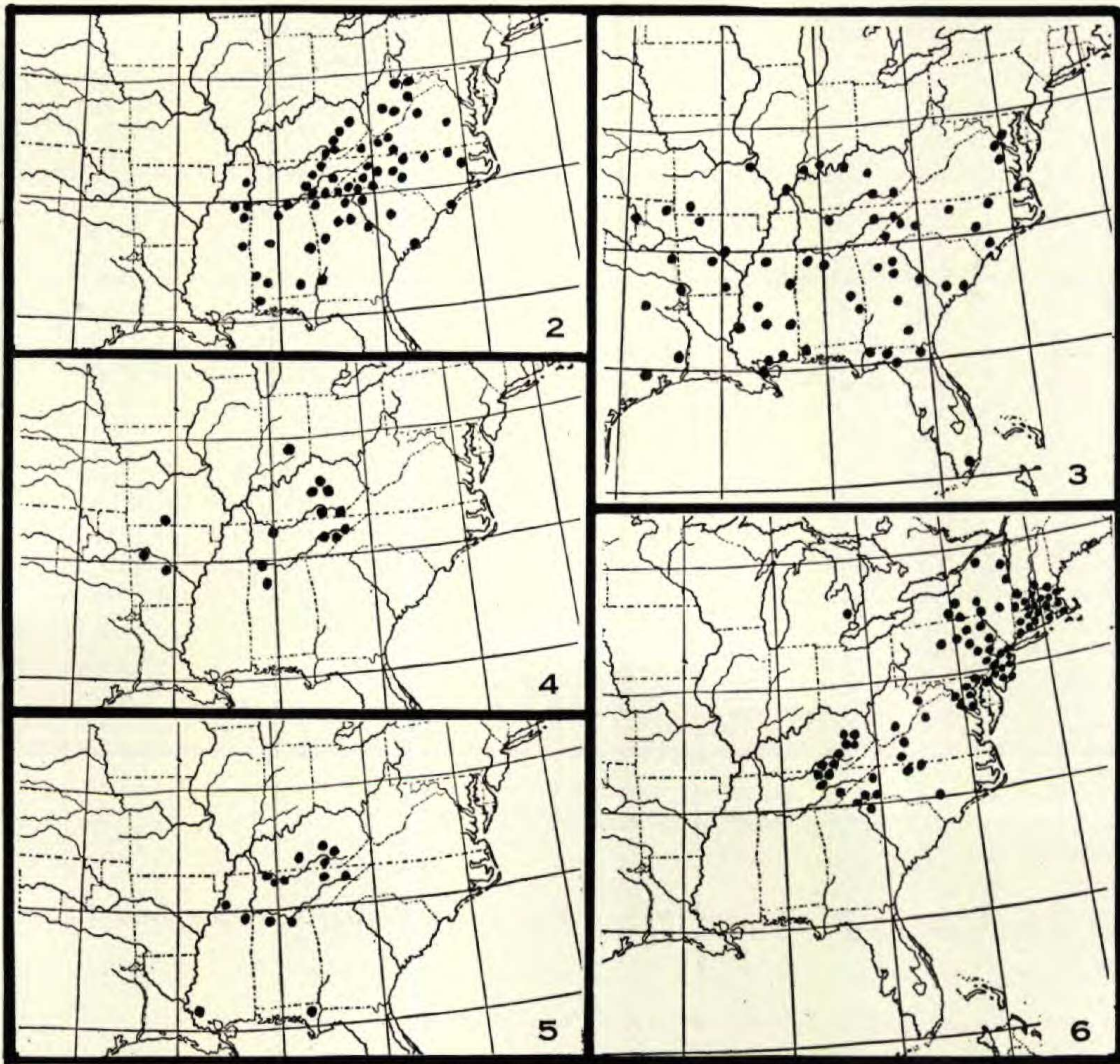


FIG. 1. Map showing boundaries of physiographic provinces and sections: Coastal Plain; Piedmont (P); Blue Ridge (BR); Ridge and Valley Province, (R&V); Appalachian Plateaus Province, made up of the Allegheny Plateau (AP); the Cumberland Plateau (CP), and the Cumberland Mountains (C). After Fenneman.

The intraneous flora of eastern Kentucky is made up chiefly of widespread species whose ranges generally include this area, of Appalachian species of wide range such as *Zanthorhiza apiifolia* L'Her. (FIG. 2), and of southern species at or near their northern limits as *Arisaema quinatum* (Nutt.) Schott, *Magnolia macrophylla* Michx., *Galactia volubilis* (L.) Britton, *Jussiaea decurrens* (Walt.) DC. (FIG. 3), *Aralia spinosa* L., *Bignonia capreolata* L., *Elephantopus tomentosus* L., *Coreopsis auriculata* L., and *Helenium tenuifolium* Nutt. Another group of intraneous species of interior or southern-interior

range,<sup>1</sup> is represented by *Trautvetteria caroliniensis* (Walt.) Vail, *Hypericum dolabriforme* Vent., *Cladrastis lutea* (Michx.) Koch (FIG. 4), *Polygala Curtissii* A. Gray, *Mechania cordata* (Nutt.) Britton. A few northern species extend southward into this area, as *Pinus Strobus* and *Betula lutea* Michx.; others occur as disjuncts and are best con-



FIGS. 2-6. Distribution of intraneous Species: (2) JUSSIAEA DECURRENS; (3) ZANTHORHIZA APIIFOLIA; (4) CLADRASTIS LUTEA, Appalachian and Ozarkian; (5) PACHYSANDRA PROCUMBENS, local; (6) LYGODIUM PALMATUM.

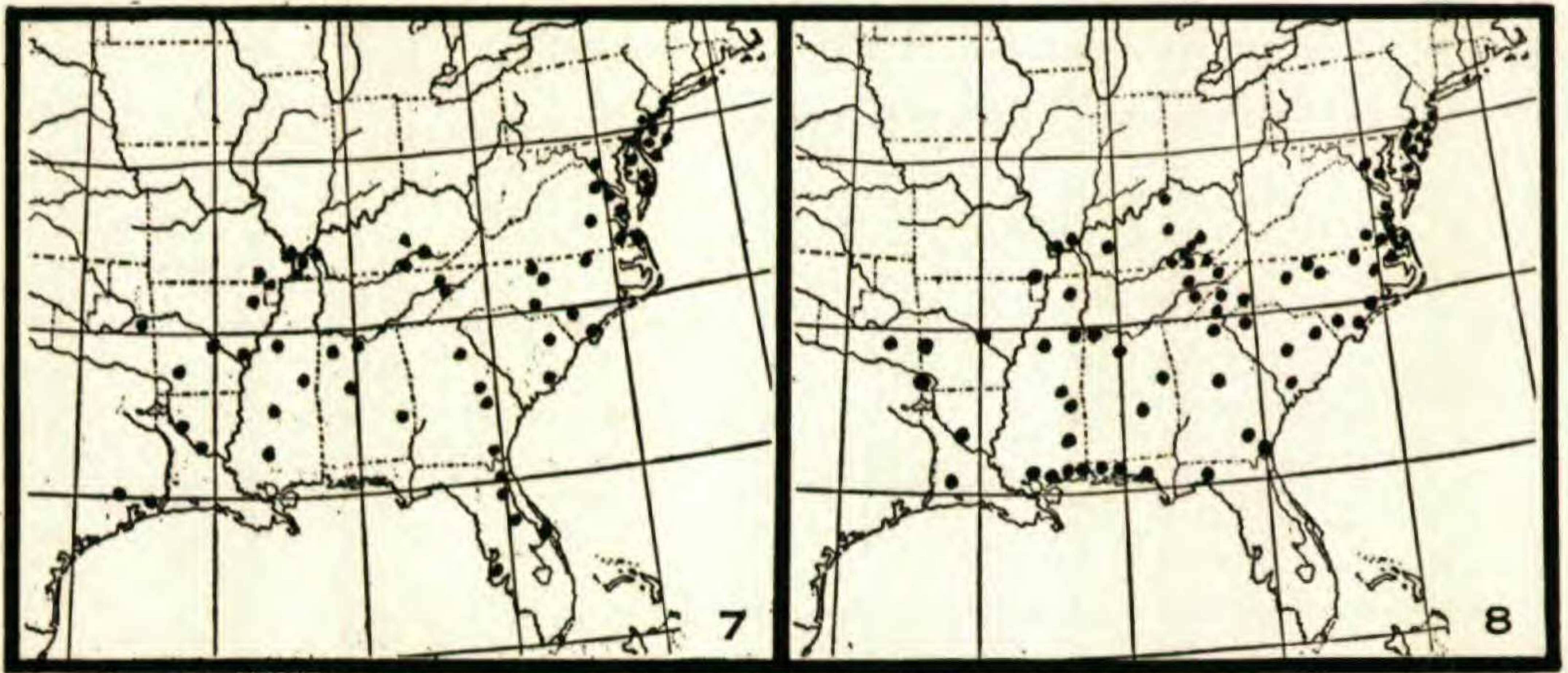
sidered with the extraneous flora. Western species are almost lacking, unless the grasses, *Andropogon furcatus* Muhl., *A. scoparius* Michx., *Sorghastrum nutans* (L.) Nash, be so considered, or the flora of disturbed areas be included (for example, *Croton monanthogynus* Michx.). In addition, there are a few extremely rare endemics—*Conradina vert-*

<sup>1</sup> Some of these species are what Steyermark (1934) designates as species common to both the Southern Appalachians and Ozark Plateau.

*icillata* Jennings (*C. montana* Small)<sup>1</sup> and *Silphium brachiatum* Gattinger<sup>2</sup>—and some localized species more or less abundant on the Cumberland Plateau, as *Pachysandra procumbens* Michx. (FIG. 5), *Lygodium palmatum* (Bernh.) Sw.<sup>3</sup> (FIG. 6) and *Gaylussacia brachycera* (Michx.) Gray.<sup>4</sup>

The extraneous species are of particular interest for they give some clues to the probable vegetational history of the area.

The Coastal Plain element is especially well represented on the Cumberland Plateau, particularly near its western margin; and much less pronounced, though present, on Pine Mountain in the Cumberlands. One Coastal Plain tree, *Quercus phellos* L. (FIG. 7) is an im-



FIGS. 7, 8. Species ranging through the Coastal Plain and Mississippi Embayment, with interior upland stations: (7) *QUERCUS PHELLOS*; (8) *ITEA VIRGINICA*.

portant species of certain swamp forests of Whitley County. Among the grasses are *Andropogon glomeratus* (Walt.) B. S. P., *Erianthus alopecuroides* (L.) Ell. (*E. divaricatus*), *Aristida affinis* (Schult.) Kunth (*A. palustris*), *Uniola laxa* (L.) B. S. P. and *Panicum longifolium* Torr.,<sup>5</sup> the first in two stations, each of the others in one on the Cumberland Plateau. *Pogonia (Cleistes) divaricata* (L.) R. Br. (FIG. 10), which Fernald (1931) considers "a typical species of the Coastal

<sup>1</sup> Known from Clear Fork River, Fentress and Morgan counties, Tennessee (Jennison, 1935) and from South Fork Cumberland River, McCreary County, Kentucky (Braun, 1936).

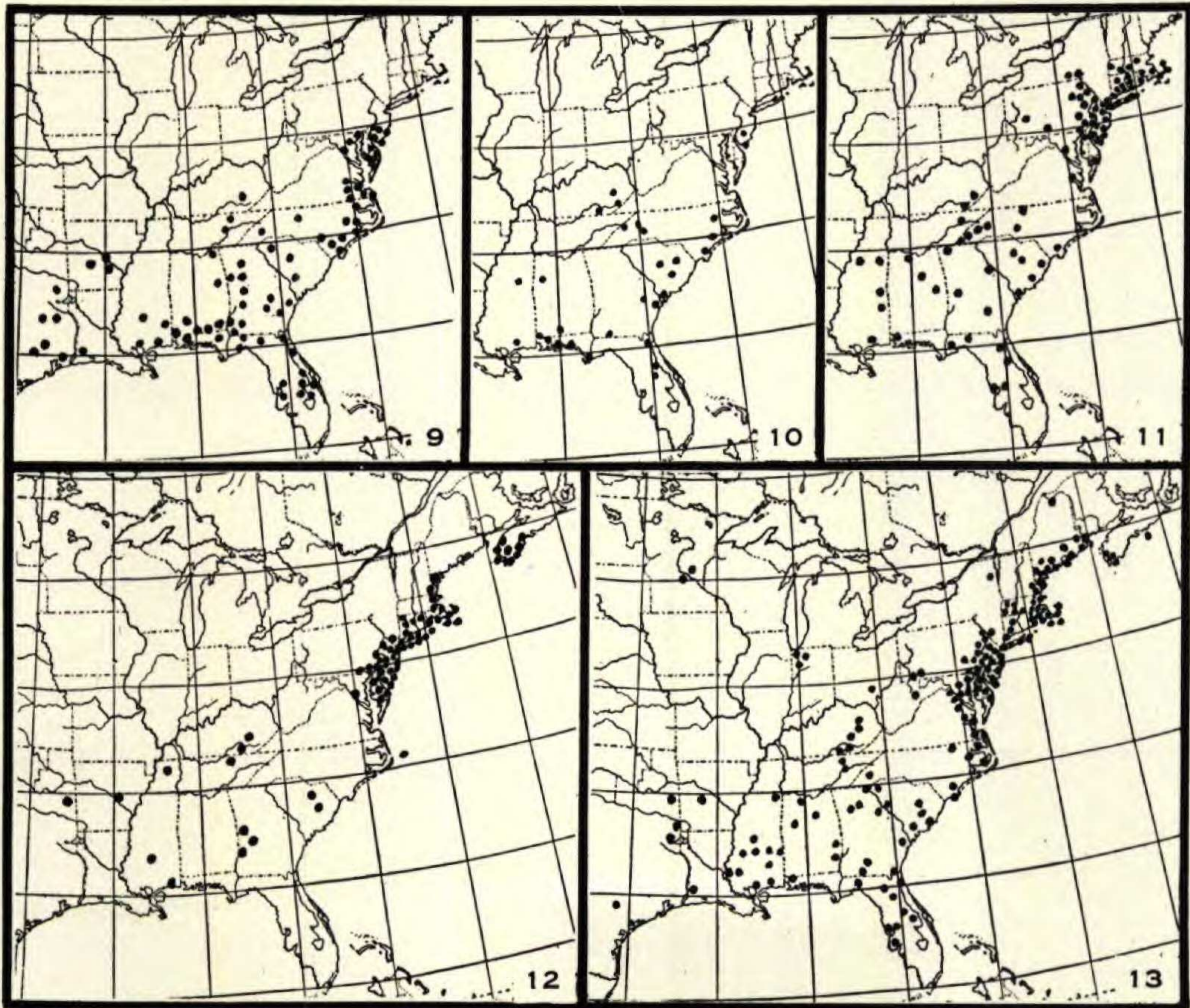
<sup>2</sup> Recorded by Small (1933) from "Appalachian Plateau, Tenn." and by Braun (1936) from Clay County, Ky.

<sup>3</sup> These upland stations considered by Fernald (1931) as relic colonies of a tropical genus.

<sup>4</sup> For map of distribution of this species, see Wherry (1934).

<sup>5</sup> The identification of these grasses verified by A. S. Hitchcock or Mrs. Chase. For ranges, see Hitchcock (1935).

Plain, and well known from high tablelands of the Southern Appalachians," is found near the headwaters of the Cumberland River between Pine and Black Mountain at 1700 feet (in Letcher County) and at the westernmost margin of the Cumberland Plateau in Wolfe



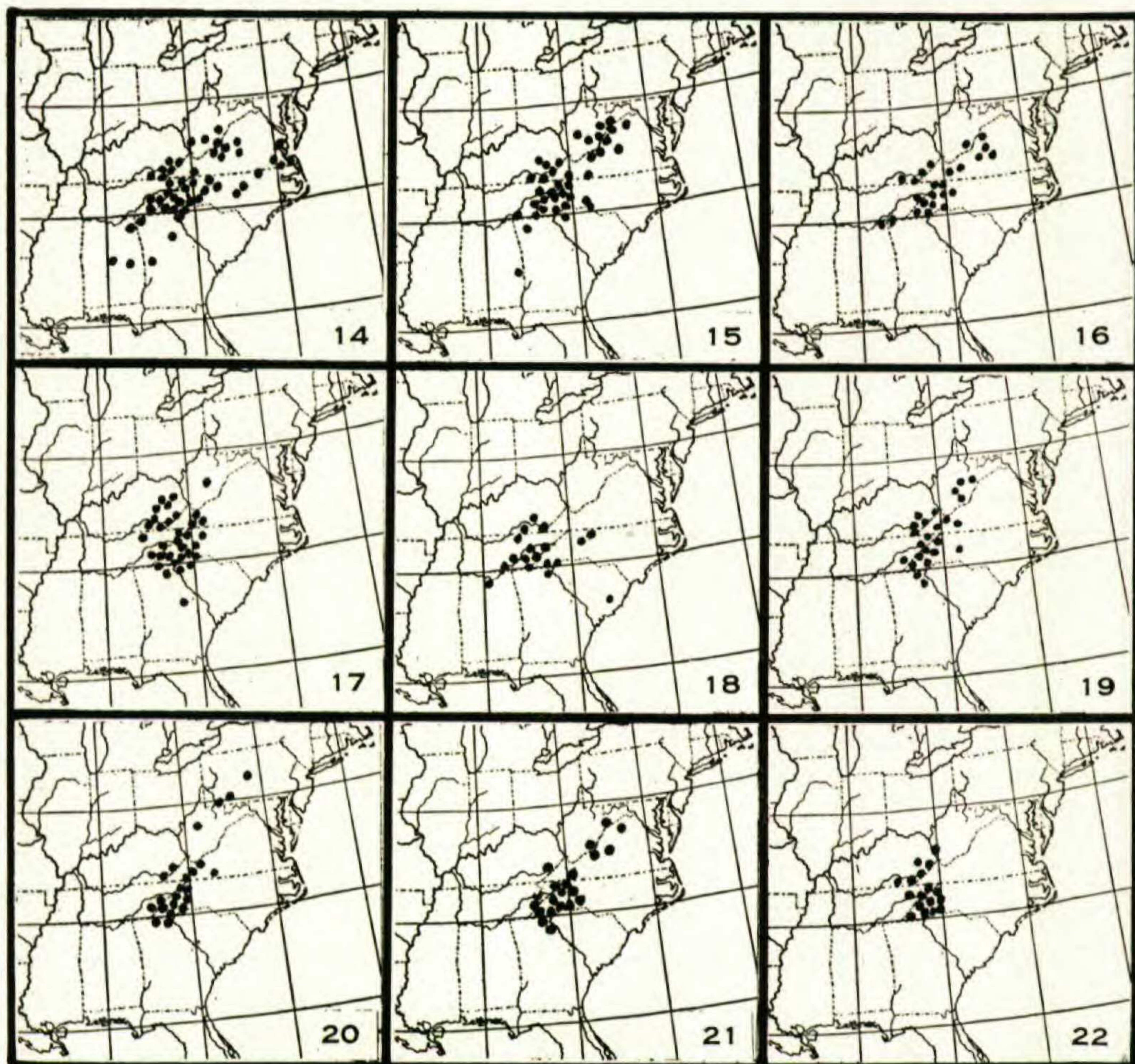
FIGS. 9-13. Coastal Plain species: (9) *GRATIOLA PILOSA*, (10) *POGONIA DIVARICATA*, representative Coastal Plain species with upland occurrences only southward; (11) *ORONTIUM AQUATICUM*, (12) *BARTONIA PANICULATA*,<sup>1</sup> (13) *VIOLA PRIMULIFOLIA*, representative Coastal Plain species with upland occurrences southward and in New England.

County and more commonly in McCreary County on sandstone knobs or monadnocks of the undissected portions of the plateau, which are remnants of the Cumberland Penepain. All three stations are far removed from the Coastal Plain and from the Southern Appalachians. *Schwalbea australis* Pennell<sup>2</sup> is another Coastal Plain species found

<sup>1</sup> *BARTONIA*, so far as known, confined to the Coastal Plain in the South, except for one station on the Ozark Plateau and three stations close to one another at the western edge of the Cumberland Plateau. Map shows distribution of *B. PANICULATA*, including *B. LANCEOLATA*, but omitting the northern varieties *SABULONENSIS*, *IODANDRA* and *INTERMEDIA*.

<sup>2</sup> Identified by F. W. Pennell. For distribution, see Pennell, 1935.

with *Cleistes* on these monadnocks of the Cumberland Plateau in McCreary County, and one which is a pronounced disjunct. *Cyperus retrofractus* (L.) Torr. is also here. The Coastal Plain *Itea virginica* L. (FIG. 8) is a dominant shrub in many a swamp near stream head-

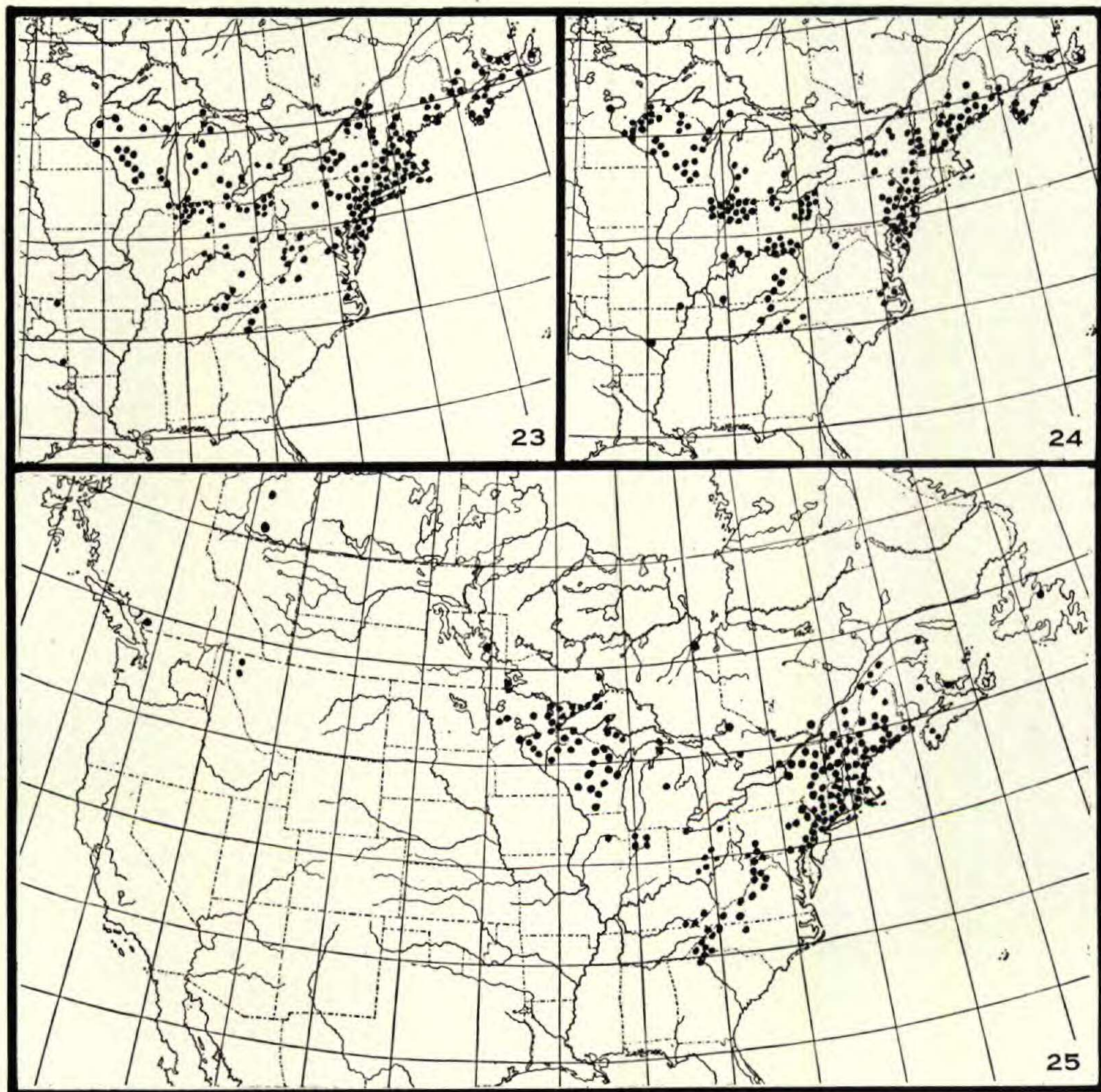


FIGS. 14-22. Southern Appalachian species: (14) *GALAX APHYLLA*; (15) *CAMPANULA DIVARICATA*; (16) *RHODODENDRON CATAWBIENSE*; (17) *CLETHRA ACUMINATA*; (18) *STEWARTIA PENTAGYNA*; (19) *MAGNOLIA FRASERI*; (20) *HOUSTONIA SERPYLLIFOLIA*; (21) *SAXIFRAGA LEUCANTHEMIFOLIA*; (22) *ASTILBE BITERNATA*.

waters on the Cumberland Plateau; *Viola primulifolia* L. (FIG. 13) is almost always found in the same situations. *Bartonia paniculata* (Michx.) Robinson (FIG. 12) in two stations in Sphagnum cushions; *Ascyrum stans* Michx., *Gratiola pilosa* Michx. (FIG. 9) and *Lobelia Nuttallii* R. & S.<sup>1</sup> in wet meadows are other Coastal Plain species that may be mentioned for the Cumberland Plateau. *Orontium aquaticum*

<sup>1</sup> For map of distribution of *Lobelia Nuttallii* see McVaugh (1936).

L. (FIG. 11); typically Coastal Plain but known from a few stations in the mountains of Pennsylvania, North Carolina and Tennessee, is on Pine Mountain in southeastern Kentucky, in Bell and Letcher counties. These are only some of the Coastal Plain species, a very



FIGS. 23-25. Northern species of general distribution northward: (23) *RUBUS HISPIDUS*; (24) *SPIRAEA TOMENTOSA* (including var. *ROSEA*); (25) *CORYDALIS SEMPERVIRENS* (Alaska stations not shown).

fair proportion of which have not hitherto been known from the area under consideration.<sup>1</sup> Ten of these plants were found together in one small area of swamp woods and wet meadow in Laurel County (Braun, 1937).

Typically Southern Appalachian species are more often found in the Cumberland Mountains—either on Black Mountain or on Pine

<sup>1</sup> Some stations recorded by Braun, 1936.

Mountain—than on the Cumberland Plateau, though they are represented there on the *western* margin. Southern Appalachian species in the Cumberland Mountains are *Anemone lancifolia* Pursh, *Cymophyllus* (*Carex*) *Fraseri* (Andr.) Mackenzie, *Magnolia Fraseri* Walt. (FIG. 19) in coves, lower slopes and on rocky summits, *Gentiana decora* Pollard, *Saxifraga leucanthemifolia* Michx. (FIG. 22), *Monotropsis odorata* Ell., and *Houstonia serpyllifolia* Michx. (FIG. 20) as low as 1600 feet. On the Cumberland Plateau only (near Cumberland Falls) is *Boykinia aconitifolia*. A few species occur in both areas—the Cumberland Mountains and the *western edge* of the Cumberland Plateau. Among these are *Astilbe biternata* (Vent.) Britton, *Galaxaphylla* L., *Campanula divaricata* Michx., *Stewartia pentagyna* L'Her., *Clethra acuminata* Michx. and *Rhododendron catawbiense* Michx. (FIGS. 14–22). The last named species, *Rhododendron catawbiense*, grows in separated stations practically throughout the entire length of Pine Mountain at about 3000 feet elevation, and on a cliff-margin at 1200 feet in McCreary County at the western edge of the Plateau and fifty miles removed from the nearest part of Pine Mountain.

Northern forms are few in the Plateau sections, though *Viola rotundifolia* Michx. (FIG. 29) is common in many stations, and *Claytonia caroliniana* Michx. (FIG. 26) only slightly less so; *Rubus hispidus* L. (FIG. 23), *Spiraea tomentosa* L. (FIG. 24) and *Pyrus melanocarpa* (Michx.) Willd. are present in swamps (the latter also on rocky summits). *Myrica asplenifolia* L. and *Solidago racemosa* Greene<sup>1</sup> occur in one river-bank station. *Taxus canadensis* Marsh. is known from one station in the Allegheny Plateau in northern Kentucky (in Carter County) but does not occur on the Cumberland Plateau. In the Cumberland Mountains, one is surprised to find *Oxalis montana* Raf. (American *Oxalis Acetosella*) (FIG. 27) which the most recent of our manuals states grows in “cold damp woods, Blue Ridge and more northern provinces, N. C. to Tenn., Man. and N. Sc.” (Small, 1933). Here it grows in several stations: on Black Mountain at 3500 feet, and as low as 1800 feet on Pine Mountain. More surprising still is the occurrence of this plant in the Allegheny Plateau at an elevation of only 700 feet on the Little Sandy River in Elliott County. *Trillium undulatum* Willd. (FIG. 30), called by Small a “typically northern type of Trillium” and said to grow in damp woods and bogs, is found in the Cumberlands in three stations: at 4000 ft. on Black Mountain in

<sup>1</sup> Identified by M. L. Fernald.



a chestnut forest with an ericaceous understory, and on Pine Mountain, at 1800 and 2200 feet, under hemlocks. Other northern species found in the Cumberland Mountains are *Circaea alpina* L., as low as 1600 feet in the Cumberland Valley; *Luzula saltuensis* Fernald, on Black Mountain in Letcher County at about 2000 feet; *Streptopus roseus* var. *perspectus* Fassett,<sup>1</sup> on north slopes of Black Mountain in Harlan County at 3500 feet; *Corydalis sempervirens* (L.) Pers. (FIG. 25) on sandstone outcrops along Pine Mountain in Bell, Harlan, and Letcher counties; and *Acer pensylvanicum* L. (FIG. 28), abundant on Pine and Black Mountain.

That this may not become a mere enumeration of species, I have omitted many of the less striking examples of the several groups of species.

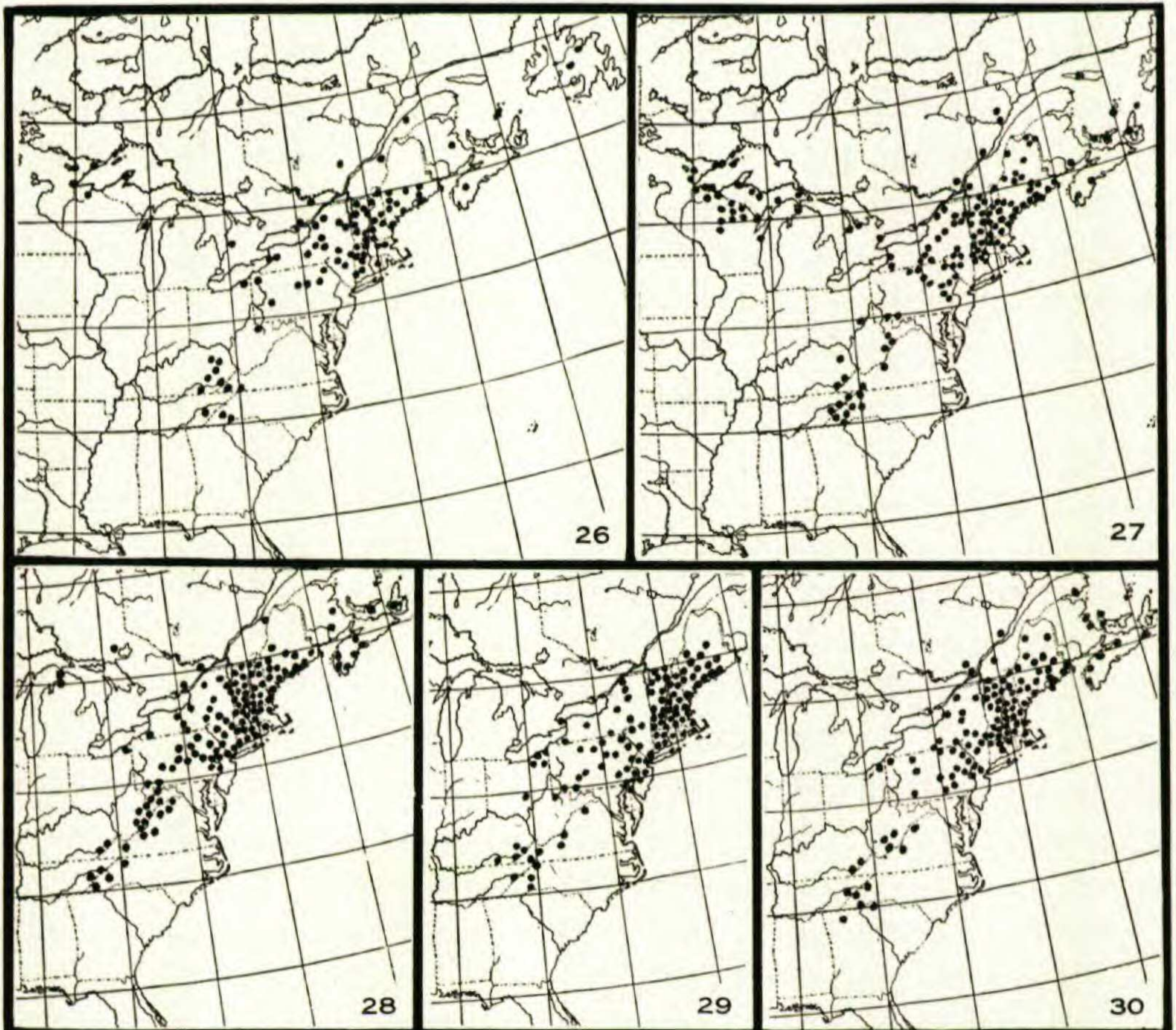
Are these observed occurrences a matter of chance, of random distribution, or have they been brought about by changing conditions in more recent geological time? Seldom do we find a more perfect example of the inter-relations of species-distribution and geological history. Hence, for explanation of the occurrences noted we must turn to the physiographic history of the area.

The ancient Paleozoic land-area of eastern North America was base-leveled, perhaps a number of times. Base-leveling favors mesophytes and swamp plants, and greatly restricts plants of cliffs and rocky summits. The last base-level which was general over this area—except for certain monadnocks—was that known as the Schooley or Cumberland Peneplain. This has been called the “Cretaceous Peneplain,” but physiographers now date it as “not older than Miocene” (fide Fenneman).

At this time we may conceive, then, of a low-lying land-mass of slight relief on which meandered sluggish streams. In places there were hills, where the base-level was incomplete, or even remnants of ledges, if very resistant rocks underlaid slopes as must have been the case along the western outcrop of the Pottsville—now the western margin of the Cumberland Plateau. Too, narrower valleys or slightly steeper protected slopes would be present where streams of the gently undulating peneplain crossed the margin of resistant rocks. This slight diversity of topography would have been a feature of the western outcrop of the Pottsville sandstone. The mountains of the southern Blue Ridge Province—the Southern Appalachians—were but very

<sup>1</sup> For the distribution of this species and its varieties, see Fassett, 1935.

incompletely base-leveled, in fact remained in almost mountainous condition, and to this it is generally agreed they owe in large part their relic-endemic flora. In southeastern Kentucky, "Pine Mountain may have constituted a low swell, several hundred feet high which, when followed longitudinally rose and fell mildly, or was subdivided into



FIGS. 26-30. Species of the northern Great Lakes region and New England, with isolated stations in the Appalachian region southward: (26) *CLAYTONIA CAROLINIANA* (exclusive of Rocky Mountain stations); (27) *OXALIS MONTANA*. Northern species whose distribution centers in New England, with isolated stations in the mountains southward: (28) *ACER PENSYLVANICUM*; (29) *VIOLA ROTUNDIFOLIA*; (30) *TRILLIUM UNDULATUM*.

long elliptical embossments."<sup>1</sup> That is, where the rugged Pine Mountain now is there was then a series of hills held by the superior hardness of the rock (the Pottsville sandstone). The higher Black Mountain, too, was represented by monadnocks on the Schooley or Cumberland Peneplain, due to another resistant sandstone.

<sup>1</sup> For certain data on the physiography of this section, the writer is indebted to Dr N. M. Fenneman for the privilege of reading a portion of the manuscript of his book, "Physiography of the Eastern United States."

These several features introduced diversity into the vegetation of the peneplain. Mesophytic forest prevailed. Swamp plants and plants of poorly drained sandy flats found favorable environment along the sluggish old-age streams and on the reduced uplands between the streams. On the sheltered slopes of monadnocks, in less open valleys crossing resistant rocks, and in hillier places generally the most mesophytic of species found favorable retreats. On the few exposed summits and ledges—as the upturned strata of Pine Mountain<sup>1</sup> and the monadnocks of the western Pottsville border—plants of dry sandy soil or cliffs persisted.

Picture this peneplain uplifted and streams given renewed cutting power. The flora of the plain suffered most, and retreated before the changing environment, moving outward onto the emerging Coastal Plain, and perhaps in part northward where uplift was less pronounced, but not without leaving remnants behind it—the present relic colonies of what are now considered Coastal Plain species. In these relic colonies are often a few somewhat northern species as *Spiraea tomentosa*, *Pyrus melanocarpa* and *Rubus hispidus* (FIGS. 23, 24), which may represent the flora which moved northward off the elevating peneplain.

“The present Cumberland peneplain is not definitely known to be anything else than the eroded and reduced Schooley peneplain, though it is regarded by some physiographers as a younger and lower peneplain itself elevated and dissected later.” In its *western* (and more typical) part, it is submaturely dissected by physiographically young valleys. “Its former character is seen in its broad remnants of a surface in which only shallow valleys of an older generation are found.”<sup>2</sup> It is underlain by the strong resistant Pottsville sandstone, here some 600 or 700 feet thick, and the immaturity is due in part to this.

Let us examine now the distribution of the extraneous species in the light of physiographic history.

The present known distribution of most of the Coastal Plain plants in the Cumberland Plateau coincides with the undissected remnants of the Schooley or Cumberland peneplain. Here they occupy swamps and wet meadows at the headwaters of unrejuvenated streams (cf. *Andropogon*, *Erianthus*, *Aristida*, *Uniola*, *Itea*, *Ascyrum*, *Bartonia*, *Gratiola*, *Lobelia*, *Viola*) or occur on the low knobs or monadnocks (*Cleistis*, *Schwalbea*, *Cyperus retrofractus*). A few are sometimes

<sup>1</sup> For vegetation and structure of Pine Mountain see Braun, 1935.

<sup>2</sup> Fenneman, Mss., loc. cit.

found along streams cut into the plateau (*Itea*, *Diodia teres* Walt., *Gymnopogon ambiguus* (Michx.) B. S. P.), or even extend a short distance westward (downstream) from the plateau (*Itea*). The relic *Orontium* on Pine Mountain occupies, in one station, a swamp on an unrejuvenated mountain summit stream, in the other, a valley swamp at the foot of the mountain.

The Coastal Plain element is of particular interest. Two possible explanations present themselves: (1) that the Coastal Plain species now on the Cumberland Plateau have migrated into this area since the development of the distinctive Coastal Plain flora; or (2) that the Coastal Plain species of the Cumberland Plateau are relics, and that they occupied this area before and during the development of the distinctive Coastal Plain flora, a part of which was then derived from the Appalachian highlands. While the two explanations are diametrically opposed, it is possible that both are in part correct, that the occurrence of certain species may be explained in one way, of other species in the other way. *Itea virginica* and *Quercus phellos* (FIGS. 7, 8), which alone of the species discussed are found in the Mississippi embayment region of western Kentucky, may have migrated from the Coastal Plain upstream onto the Plateau. The occurrence of the other species on undissected remnants of the plateau or on monadnocks and their wide separation from the general area of their ranges, point to the relic interpretation. Furthermore, the localization of a dozen or more of Coastal Plain species in a single swamp (in Laurel County) but a few acres in extent (Braun, 1937) and the absence of most of these species from other stations (so far as yet ascertained) is difficult to explain on a basis of recent migration. The association of northern plants (*Spiraea*, *Rubus*, *Pyrus*) with these, and their physiographic location (on undissected portions of the Cumberland peneplain) indicate ancient occupancy much restricted. Late Tertiary or early Pleistocene segregation of floras, coincident upon changing climates and dissection accompanying the elevation of the peneplain, resulted in migrations northward of those species which later became "northern" species, and southward of those which have become "coastal plain" species.

The southern Appalachian element is made up of species whose general range is that of the southern Blue Ridge Province, that great area which was very incompletely base-leveled. These may be thought of as representatives of ancient genera whose formerly more wide-

spread distribution became greatly curtailed by the time of maximum development of the Cumberland or Schooley peneplain. If the distribution of these species is related to this event in the physiographic history of the Appalachian highlands, then at least some of them should occur in other areas whose history was similar to that of the southern Blue Ridge, and in which diversity of topography was maintained. In the Cumberland Mountains there were monadnocks; along the western margin of the Cumberland Plateau the nature of the underlying rock made highly probable a certain topographic diversity even on the peneplain. In these two places Southern Appalachian species do occur. They are well represented in the Cumberland Mountains by high mountain species (*Saxifraga leucanthemifolia*, *Houstonia serpyllifolia*, (FIGS. 20, 21); and in the Cumberland Mountains and along the rugged western margin of the Cumberland Plateau (by *Clethra*, *Galax*, *Stewartia*, *Astilbe*, *Campanula divaricata*, and *Rhododendron catawbiense*, FIGS. 14–18, 22). That is, these southern Appalachian forms belonging to the most ancient genera, and whose ranges were restricted by peneplanation, now occur as relics on all or part of the former monadnock areas but not elsewhere.

The northern element is made up of species of general northern range (FIGS. 23–25) which reach their southern limits here or are uncommon southward, and of species growing in the north or northeast and in the higher mountains southward (FIGS. 26–30). As far as range and habitat in the southern mountains are concerned there is usually little difference between this latter group of northern plants and certain Southern Appalachian species (cf. *Saxifraga leucanthemifolia*, *Houstonia serpyllifolia*, FIGS. 20, 21).

The range of the northern species is in part at least a result of post-Pleistocene migrations, for all northern stations were attained in this way. Stations southward of the limits of glaciation may be interpreted in either of two ways: (1) they may be relics of a more southern range brought about by southward migrations during the Pleistocene; or (2) they may be still more ancient, relic southern stations of species which, during the final segregation of northern and southern types in late Tertiary or early Pleistocene time, became the northern flora. If the present range is the result of Pleistocene and post-Pleistocene migrations, the species should be expected at higher elevations or in relic boreal habitats. This is not true of most of the northern species in the Cumberland Mountains. If the present range is the result of

late Tertiary segregation followed by post-Pleistocene northward expansion of range, the species should be expected, in the south, in physiographically old regions, *i. e.*, in regions where base-leveling was not attained, and might well be in company with species of southern range rather than in relic boreal habitats. This is true of most of the northern species in the Cumberland Mountains and Cumberland and Allegheny Plateaus—in only one place is there any suggestion of grouping of northern species, and even here distinctly Southern Appalachian species are present also.<sup>1</sup> Northern and Coastal Plain species also occur side by side.

Even if altitudinal limits of forest types had been lowered considerably during the Glacial Epoch, there would still have remained numerous breaks in continuity of the mountains, where valleys intervene. If it is postulated that the Pleistocene southward migration of northern forest vegetation was so great as to completely occupy the mountains, it would be difficult to reconcile the present coincident occurrence of northern species with Southern Appalachian and Coastal Plain species. The finding of spruce and fir pollen in a bog in northeastern Tennessee (Sears, 1935) need not be taken as infallible evidence of a great southward swing of northern forests. Mountain summits of the Cumberlands, though today without spruce or fir, are so close to the elevation at which these trees (especially spruce) are to be expected, that their once higher summits may have had them. It is not difficult to conceive of sufficient lowering of altitudinal limits as to permit spruce-fir summit forest more extensive than in the Great Smoky Mountains today. It is difficult to conceive of southward movement of a spruce-fir forest to Tennessee, *without displacing all extremely southern and Coastal Plain species*. If these were displaced, their presence now could be explained only by recent migrations, migrations into occupied territory. But the time has not been long enough to account for their return to the isolated stations in which they now occur.

#### SUMMARY AND CONCLUSIONS

As interpreted here, the flora of the Cumberland Plateau and Cumberland Mountains in Kentucky displays strong southern affinities, indicated by (1) the large proportion of species of southern range in the intraneous flora, (2) the Southern Appalachian species, and (3) the Coastal Plain species. Northern species are present and are

<sup>1</sup> On Pine Mountain, in southeastern Kentucky. See Braun, 1935.

interpreted as representing survival from the undifferentiated Tertiary flora. The affinities with the Southern Appalachian or Blue Ridge flora are so striking as to indicate that the Cumberland Mountains are floristically a part of the Southern Appalachians, though they are physiographically isolated by the valleys of the Ridge and Valley Province. This relationship is correlated with physiographic history, which was similar in the two regions, both of which escaped complete peneplanation.

The perfect accord between distribution of disjunct species and location of physiographically old situations—monadnocks, undissected parts of peneplains, unrejuvenated streams and undrained plateau swamps—supports the interpretation of species-distribution based on a known sequence of physiographic events.

#### ACKNOWLEDGEMENTS

The distribution-maps in this paper are based upon data secured from the Gray Herbarium, the herbaria of the New York Botanical Garden and the Academy of Natural Sciences of Philadelphia, to the officers of which the writer is indebted. In a few instances, where the picture of distribution thus gained was erroneous either because of lack of data from states in the more westerly part of the ranges or because certain Gulf Coastal Plain species thus mapped appeared more frequent in the Appalachian highlands (where every station is probably represented by a specimen) than on the Coastal Plain (from which fewer specimens of common plants reach the larger eastern herbaria), additional data were taken from sources here noted. Additional Ohio records are taken from Schaffner, Revised catalog of Ohio Vascular plants (1932); additional Indiana records of shrubs, from Deam, Shrubs of Indiana (1932); additional records for Mississippi from Lowe, Plants of Mississippi (1921); and for Alabama from Mohr, Plant life of Alabama (1901). To Dr. F. K. Butters of the University of Minnesota, Mr. C. C. Deam of Bluffton, Indiana, Dr. J. H. Ehlers of the University of Michigan, Dr. Norman C. Fassett of the University of Wisconsin, Dr. Hazel Schmoll of the Field Museum, Chicago, and Dr. J. H. Schaffner of Ohio State University, the writer is indebted for additional data from their respective states.

The Kentucky records are based chiefly upon the collections of the writer. The herbaria of the University of Kentucky and of the Kentucky Agricultural Experiment Station were examined by the writer for any additional county records contained therein.

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TWO RARE WEEDS.—While exploring in the vicinity of the Wyman Dam at Moscow, Maine, on August 21, 1934, the writer found a crucifer growing on the fill above the dam which did not seem to belong to any of the species with which he was familiar. A specimen was submitted to Mr. C. A. Weatherby of the Gray Herbarium who identified it as *DESCURAINIA HARTWEGIANA* (Fourn.) Britton. This plant does not appear in the herbarium of the New England Botanical Club and is in the Gray Herbarium only from the West and from Canada